13B.2 - Clustering of Global Tropical Cyclone Formation

Thursday, May 12, 2022

11:00 AM - 11:15 AM

Galerie 3 (New Orleans Marriott)

Abstract

Why do tropical cyclones tend to form in specific regions at the global scale? While sea surface temperature (SST) appears to be most plausible explanation for the clustering of global TC formation due to the direct alignment of warm SST regions and TC formation clusters, potential impacts of large-scale atmospheric circulations that are indirectly induced by SST has not been well understood. Using the GFDL AM4 model with different SST distributions, it is shown that the clustering of global TC formation is mainly determined by large-scale circulations in response to given SST distribution, rather than the direct enthalpy fluxes from the ocean surface. Our various zonally-homogenous SST simulations under realistic land-surface coverage show that the clustering of TC formation occurs as a consequence of the breakdown of the zonal atmospheric circulations, which produces specific “hot spots” for TC formation. The results are robust across model settings and climate warming scenarios in the absence of zonal SST variation, thus offering a new insight into the role of large-scale atmospheric circulations on the tropical cyclogenesis climatology.

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